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Foreword

At the moment the Asian republics of the Soviet Union are at different stages of their demographic transition from "pre-modern" high fertility levels to "modern" low fertility while the Western parts of the Soviet Union are already past this transition and exhibit even sub-replacement fertility. Any population projection should take account of this apparent heterogeneity. As compared to the conventional low-, medium-, and high-variant approach to population projection the scenario approach chosen in this paper has the advantage that it can more directly point at the consequences of different assumptions on future paths in the individual republics of the Soviet Union.

Wolfgang Lutz
Deputy Leader
Population Program

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Future Regional Population Patterns in the Soviet Union: Scenarios to the Year 2050

Sergei Scherbov and Wolfgang Lutz

1. INTRODUCTION

In most countries of the world people call the Soviet Union Russia and its inhabitants Russians. This historically grown usage of the word Russian has long been incorrect but in the future it will even further lose its justification since soon less than half of the population of the Soviet Union will be living in the Russian Republic. When speaking about ethnicity this is even less the case because the Russian Republic also includes different ethnic groups.

In this study we will not look at ethnicity but only at regional differentials as given by the structure of republics. Part of the reason for this lies in the availability of data on vital statistics which are readily available only for republics. But in a very crude sense relative changes in the population composition by republics also correspond to changes in the composition according to major ethnicities.

The results of this study will impressively demonstrate the great regional variability of demographic patterns in the Soviet Union. As concerns fertility the Soviet Union includes populations with sub-replacement fertility as low as in many highly industrialized countries and regions (such as Tadzhikistan) with fertility levels higher than in most developed countries. Hence attempts to treat the Soviet Union as an homogeneous aggregate and prepare population projections on this highly aggregate level[1] have about the same value and justification as projecting the world population without differentiating by country or even continent.

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[1]Recently Kingkade (1988) published scenarios for the population growth in the USSR to the year 2025 which does not give any regional breakdown.

This paper on the impact of regional demographic trends in the Soviet Union has two parts. First we study the trends in regional age-specific fertility rates since 1959 and assess by quantitative means the extent of family limitation and the current stage of the republic in the process of demographic transition. In a second part we define three different scenarios of future fertility and mortality trends for republics with the alternatives of continued diversity or convergence of fertility and mortality levels. Finally, the impact these alternative projections up to the year 2050 will have on the distribution of the Soviet population over republics and consequences such as differential patterns of population aging will be discussed.

2. RECENT DEMOGRAPHIC TRENDS BY REPUBLICS

In 1987 the USSR population exceeded 281 million people (*Vestnik statistiki*, No. 5, 1987). The national average crude birth rate was 19.4 per thousand and crude death rate 10.6 per thousand in 1984–85, implying an annual natural increase of 8.8 per thousand. In 1983, 72.6% of the total Soviet population lived in the European USSR and 27.4% lived in the Asian parts.

More than half of the Soviet population lives currently in the Russian Republic but already less than half of all babies born in the Soviet Union are born in this large Republic that stretches from Leningrad to Vladiwostok. Certainly this will have implications on the future regional composition of the Soviet Union. Table 1 indicates the discrepancies between the share of the total living population and the share of all newborn. We see that in 1970 the Russian Republic, Ukraine, and Belorussian had significantly lower proportions of all births than of the total population. All other republics have higher proportions of births (most significantly Uzbekistan) or approximately equal proportions.

In the 1970s birth rates declined in most of the high-fertility republics and in both urban and rural populations. Thus, in almost all the republics the rate of natural increase was lower in 1980 than in 1970. However, the differences between the growth rates in the highest and lowest-fertility republics increased even further to a factor of 22 between growth rates of 0.13% and 2.9% in 1980 in Latvia and Tadzhikistan, respectively.[2] Today, the Central Asian Republics, which contain one tenth of the total population, account for one third of the country's natural increase.

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[2]See: *The USSR National Economy in 1980* (1980), Moscow, p. 32–33.

Table 1. Proportions of the total population and of all births in the republics of the Soviet Union, 1970.

Republic	Population (in '000s)	Proportion of USSR	Mean Age	Births		Difference in Proportion of Population and Births
				Absolute	Proportion	
RSFSR	130079.2	53.8	32.0	1900	45.0	-8.8
UkrSSR	47126.5	19.5	33.6	719	17.0	-2.5
BelSSR	9002.3	3.7	31.9	147	3.5	-0.2
UzbSSR	11799.4	4.9	24.6	402	9.5	4.6
KazSSR	13008.7	5.4	26.6	307	7.3	1.9
GrSSR	4686.4	1.9	30.9	90	2.1	0.2
AzSSR	5117.1	2.1	24.9	151	3.6	1.5
LitSSR	3128.2	1.3	32.9	56	1.3	0.0
MolSSR	3568.9	1.5	29.5	70	1.7	0.2
LatSSR	2364.1	1.0	35.8	34	0.8	-0.2
KirSSR	2932.8	1.2	25.9	90	2.1	0.9
TadSSR	2899.6	1.2	23.7	102	2.4	1.2
ArmSSR	2491.9	1.0	26.1	56	1.3	0.3
TurkmSSR	2158.9	0.9	24.1	77	1.8	0.9
EstSSR	1356.1	0.6	35.4	22	0.5	0.0
USSR	241720.1		31.2	4225		

Table 2. Gross Reproduction Rates from 1970–1980 in the Soviet Republics.

Republic	1970	1975	1980
RSFSR	1.01	0.96	0.94
UkrSSR	1.04	0.97	0.98
BelSSR	1.14	1.03	1.01
UzbSSR	2.83	2.62	2.45
KazSSR	1.66	1.56	1.46
GrSSR	1.28	1.17	1.12
AzSSR	2.06	1.82	1.66
LitSSR	1.14	1.05	1.00
MolSSR	1.31	1.19	1.19
LatSSR	0.99	0.93	0.94
KirSSR	2.44	2.27	2.06
TadSSR	3.03	2.99	2.88
ArmSSR	1.53	1.30	1.19
TurkmSSR	2.93	2.75	2.56
EstSSR	1.07	1.03	1.00

From this it becomes obvious that differential fertility will induce significant changes in the regional distribution of the Soviet Union. Hence, the the results of the scenarios conducted in this study will heavily depend on the kind of fertility assumptions made. In order to evaluate the possible future paths of fertility in the republics of the Soviet Union a thorough study of fertility trends over the last decades is essential, especially when we believe that the process of demographic transition will continue and bring the fertility levels down substantially once it has started in a society. For this purpose we will focus in the following sections rather closely at recent trends in age specific fertility rates. From this we try to infer especially for the Asian republics at what point of the demographic transition they may be assumed to stand now, and what are likely paths for the future.

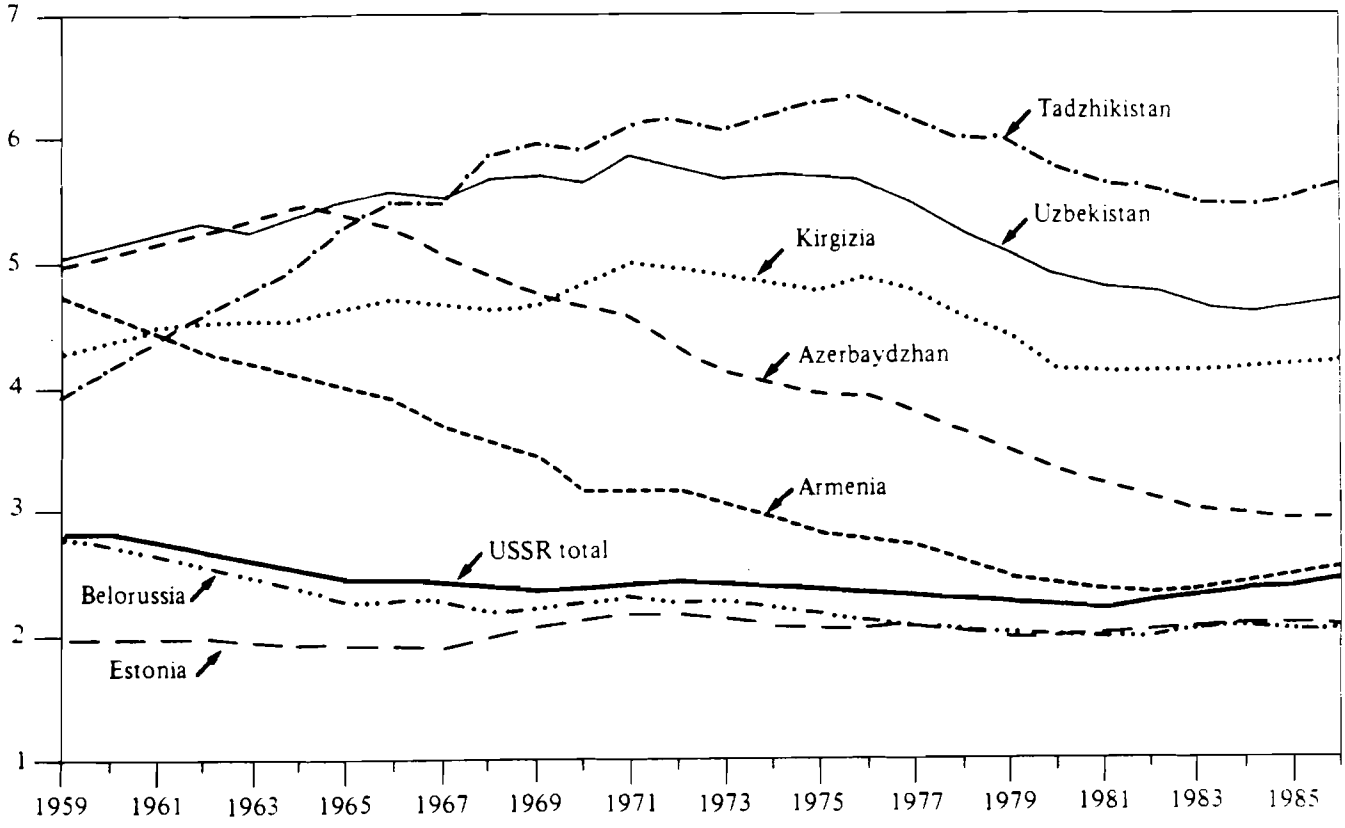


Figure 1. Total fertility rates in selected Soviet republics, 1959–1986.

Figure 1 depicts trends in the level of the total fertility rate between 1959 and 1985 for the complete Soviet Union and for eight selected republics. In spite of very divergent paths of development in the republics, the aggregate fertility levels in the complete Soviet Union look very stable around a TFR of 2.3 to 2.6. The only features worth noting are a slight decline between 1959 and 1965 and a very weak increase after 1982. This recent increase might be explained in part by a change in weights toward the high-fertility republics, but it might also reflect some real change in behavior, for example due to the

measures accepted in the USSR in 1981 to increase fertility. In the Asian republics the TFR ranges between 4 and 6; while in the Baltic republics, the Ukraine, Belorussia and in the Russian Republic, fertility now is around replacement level or even somewhat below. These regional differences are explained by social, ethnic and other peculiarities of different segments of the USSR population.

Three Fertility Patterns

With respect to their trends over time, the Soviet republics might be classified into three categories: (1) the high natural fertility republics; (2) the middle, transitional-fertility republics; and (3) the low, controlled-fertility republics.

Uzbekistan, Azerbayazhan, Turkmenistan, and Tadzhikistan fall into the first category. Tadzhikistan, a relatively small republic bordering Afghanistan with currently the highest level of fertility (a TFR of 5.7 in 1986), shows clearly increasing fertility levels between 1959 and 1976, and only a slight decline thereafter. As in many high-fertility countries the reason for such a marked fertility increase lies most probably in a decreasing incidence of sterility and a shortening of birth intervals owing to changes in traditional behavior. The other three republics in this category show similar trends, with different turning points from increase to decline. In Azerbayazhan fertility increased until 1964 and then entered a steep and lasting decline. In Uzbekistan fertility levels peaked around 1970 and declined thereafter. Turkmenistan, which is not shown on the graph, followed a line of development almost identical to that in Uzbekistan, only at a slightly lower level of fertility.

The second group of republics includes Armenia, Kazakhstan, and Moldavia and shows steep fertility declines between 1959 and the late 1960s, followed by slower declines or even stability. These republics seem more advanced in their demographic transition than the republics in the first category, and we seem to have caught the tail of the fertility transition in the early 1960s. In Kazakhstan the pattern might be more complex because of the great heterogeneity of the population consisting of high fertility Kazakhs and other ethnic groups with low fertility (about 50% of the population).

The third, low-fertility category consists of republics that have already passed through the secular fertility decline and show only some post-transitional fluctuations. In Estonia (shown in Figure 1), which is one of the lowest-fertility republics in the Soviet Union, we note a relatively steep fertility increase between 1967 and 1971. We could speculate that this was a phenomenon similar to the baby boom in most Western countries. The pattern in Latvia is similar to that in Estonia. Lithuania followed the same

trend at a somewhat higher level of fertility. The very populous Ukraine showed a slight decline at an already low fertility level until 1965 and almost no change thereafter—similar to the trend in the Russian Republic, which is by far the largest republic in terms of territory and people.

Applying the paradigm of demographic transition to the fertility patterns in the Soviet republics observed between 1959 and 1986 and discussed above, we may interpret the different categories of republics as representing different phases of a transition process from natural to controlled fertility, with Tadzhikistan and Uzbekistan the latest to follow this trend.

We investigate this point further by looking at age-specific fertility rates in selected republics and by calculating the index of family limitation.

Age-specific Fertility Rates

Data on fertility were taken from two sources (Vishnevsky et al. 1988; Urlanis and Borisov 1984). Figure 2 gives the trends in age-specific fertility rates for Estonia. The trends are generally rather smooth. The greatest discontinuity was the almost 30% fertility increase for women in the prime childbearing group, age 20–25, between 1967 and 1972. After 1972 the rate remained stable at the new high level. Although we do not know the reason for this phenomenon, we may assume that it had to do with changes in marriages pattern because the fertility rate of women aged 15–20 also increased substantially; this increase, however, stretched out over a much longer period. In other groups the fertility increase was a short-term phenomenon visible also in the age groups 25–30 and 30–35. Beyond age 30 fertility declined slowly over the whole period. This is a clear indication of a controlled-fertility regime.

In Figure 3 we see the trends in age-specific fertility rates for Uzbekistan, a high-fertility republic. The fertility of women between ages 20 and 30 increased from 1959 to 1976 and then slowly declined. For the next age group, 30–35, the increase lasted only until 1969. For women aged 35–40 the increase was less pronounced, but the decrease after 1970 was very strong. Women above age 40 show declining trends since the early 1960s.

What explains the fertility increase for younger women followed by a decline? We suggested above that the initial increase in already high-fertility republics was not due to an increase in desired family size, but due rather to an increase in the biological potential for childbearing. We may assume that within a natural-fertility regime increases in average fertility levels can be explained by changes in the proximate fertility determinants:

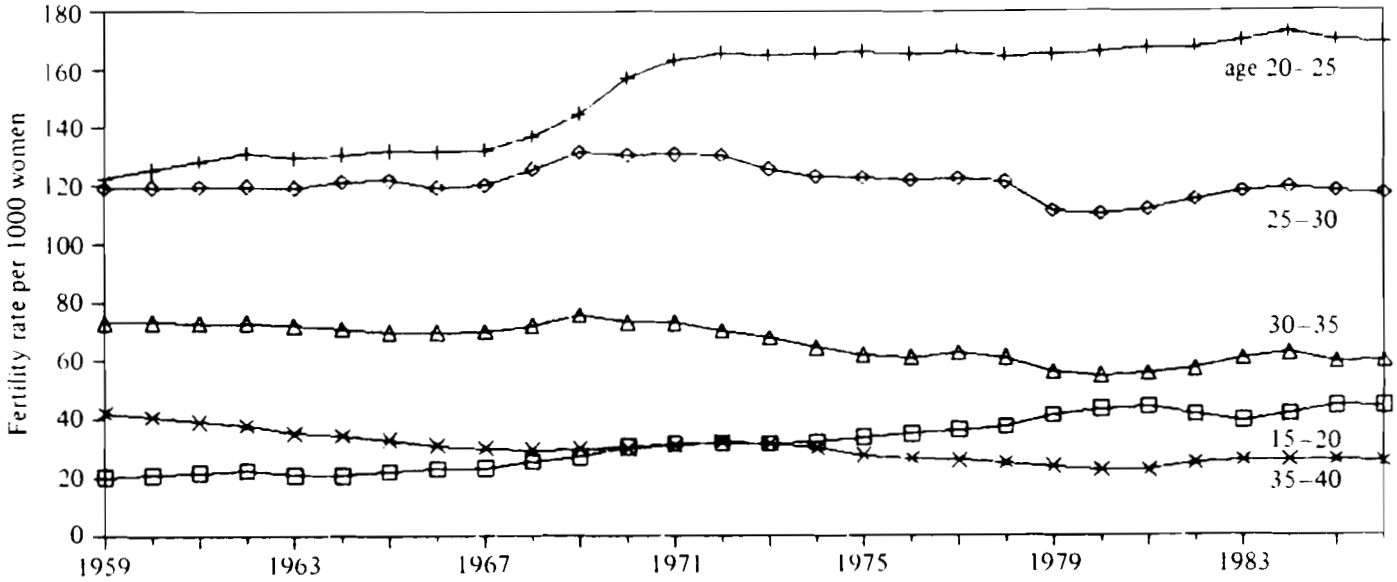


Figure 2. Age-specific fertility rates in Estonia, 1959–1985.

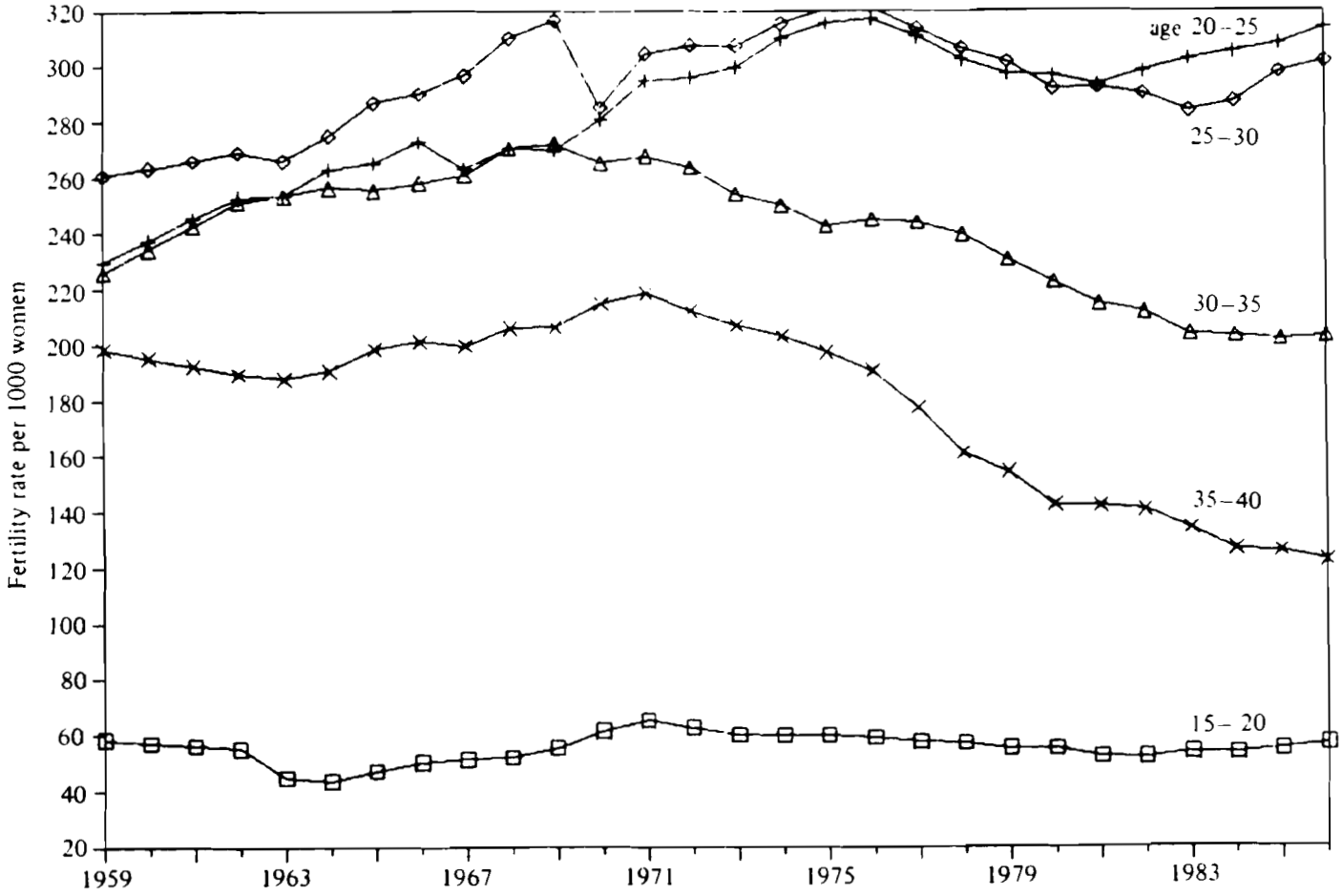


Figure 3. Age-specific fertility rates in Uzbekistan, 1959–1985.

fecundability, breastfeeding and the exposure to intercourse. It seems safe to assume that increasing educational standards together with improvements in health care in the high-fertility republics resulted in lower sterility rates and higher monthly probabilities of conception. A reduction in the percentage of women breastfeeding, and in duration of breastfeeding, is another possible explanation for increased fertility levels. Fertility declines at higher ages, however, indicate the advent of fertility control, where women consciously limit family size when they already have the number of children they want.

Transition to Controlled Fertility

The change from natural to controlled fertility can best be illustrated by the change in the shape of age-specific fertility rates. If the curve is concave (to the origin) at higher ages, fertility is natural with older women still demonstrating relatively high fertility. If the curve is convex, this indicates controlled fertility because older women tend to have lower fertility in response to higher numbers of children. This is true regardless of the level of fertility.

Figure 4 gives age-specific fertility curves for Uzbekistan in 1959 and in 1985. In 1959 the curve was clearly concave. In 1985 the level of fertility was still high, but the shape had already changed dramatically and clearly indicated controlled fertility. It had about the same shape as the controlled-fertility curves in Estonia, Belorussia, and the average of the whole Soviet Union in 1985.

Coale and Trussell (1974) suggested a quantitative way to assess the degree of fertility control in a population. Among others, their model is designed to estimate a parameter m of fertility control, which measures the degree of deviation from natural fertility. We have applied the Coale–Trussell model to overall age-specific fertility rates from 1959 to 1986 (with the exception of a few years that were interpolated). This model was also used to convert empirical five-year age groups into one-year age groups. In almost all cases the fit was good. But for a few high-fertility republics we found that observed fertility rates in older age groups were higher than those estimated by the Coale–Trussell natural-fertility model. This might be a clue to the existence of a somewhat different standard natural-fertility schedule in Soviet Asia.

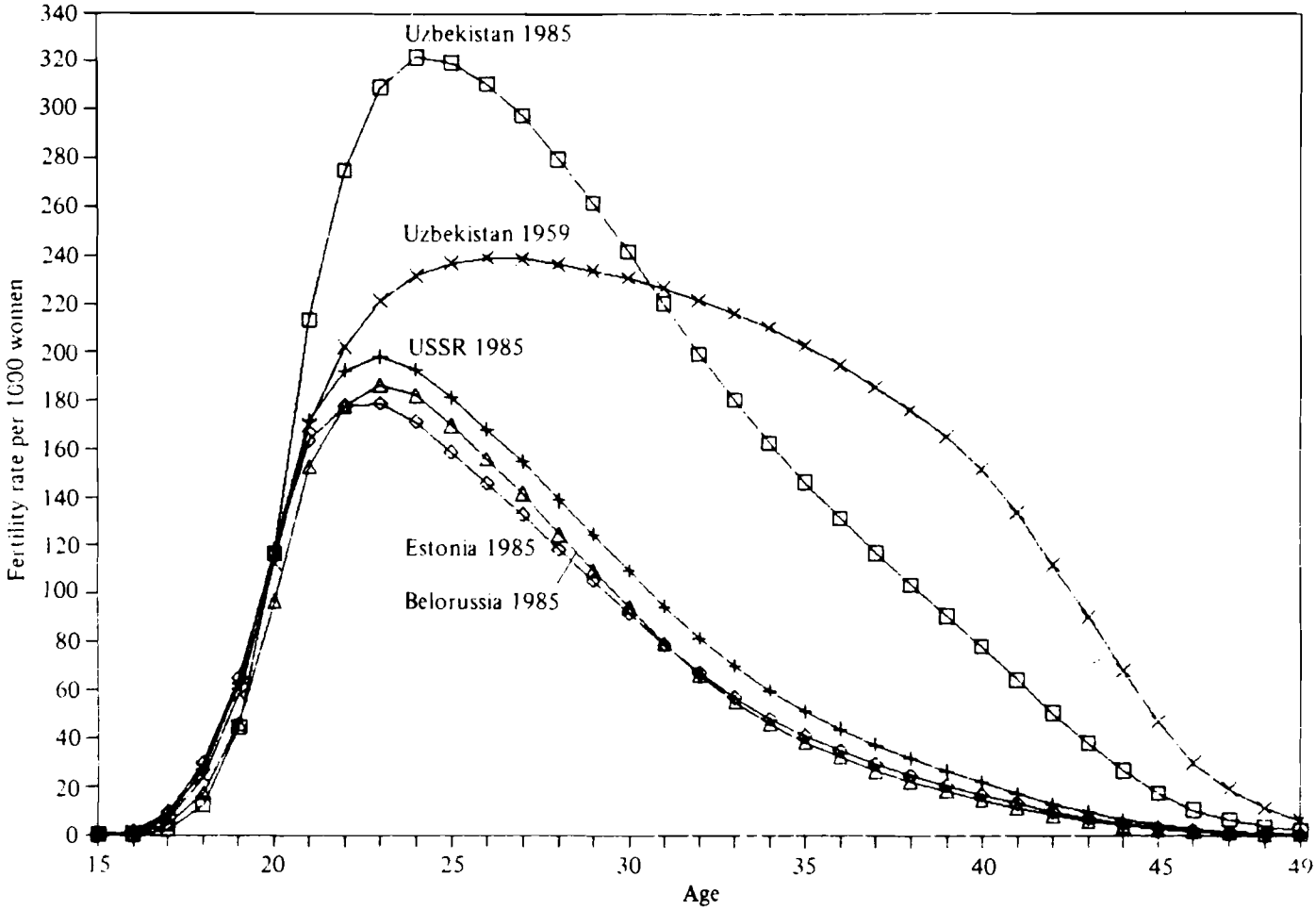


Figure 4. Age patterns of fertility in selected republics and years.

The degree of deviation from natural fertility measured by m is given in Figure 5 for three selected republics and the Soviet Union as a whole. Values of m close to 0 imply natural fertility. The shift to controlled fertility is gradual and takes place somewhere between $m = 0.5$ and $m = 0.8$. Thus, in Uzbekistan fertility proved to be virtually uncontrolled until the late 1970s. By 1985 Uzbekistan had reached a level of fertility control that is comparable to the highly advanced republics in the late 1960s. Although this index gives only a crude indication of a fertility regime, we clearly see the structural change for Uzbekistan and the further trend toward higher control in the European republics and the Soviet Union as a whole.

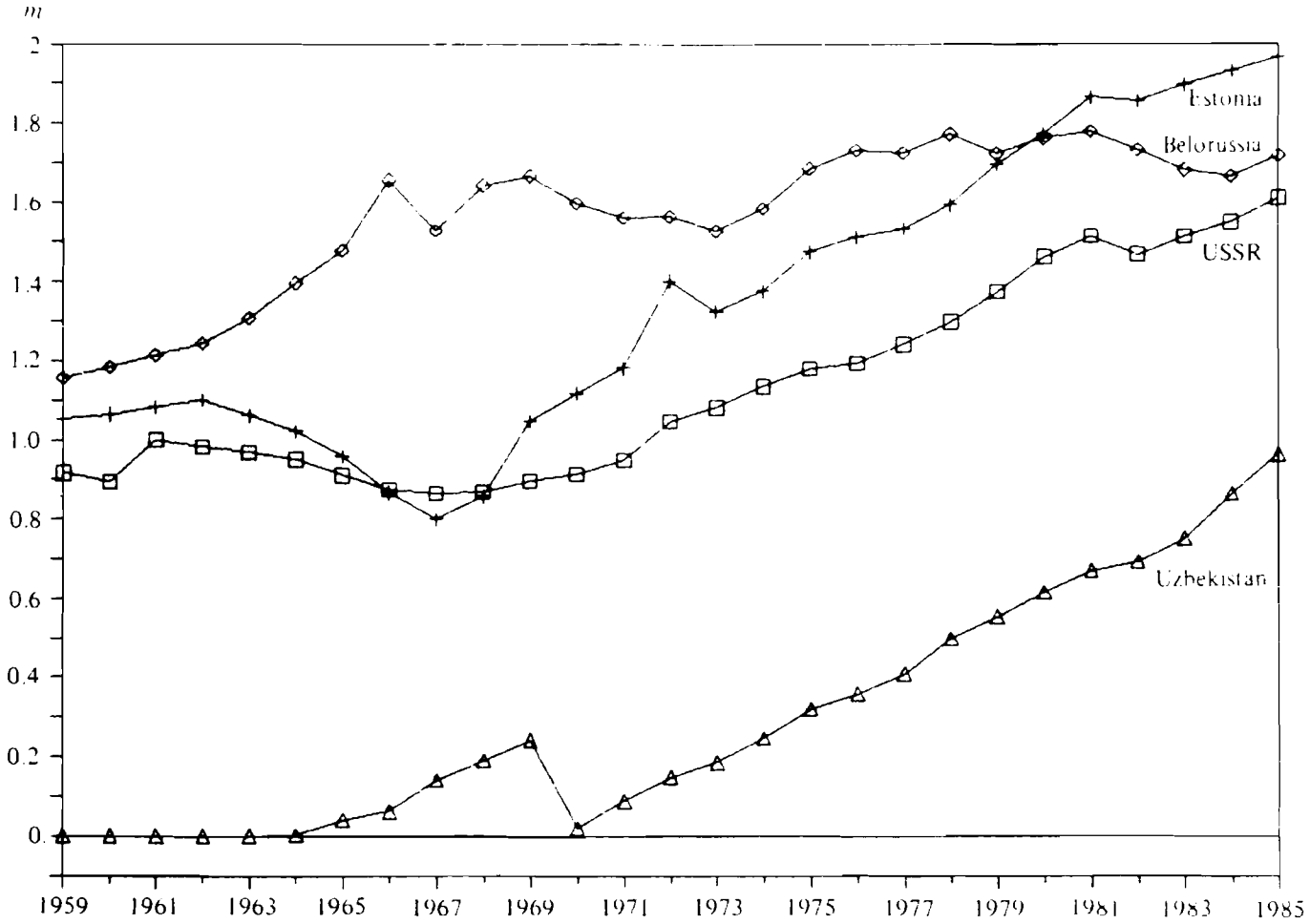


Figure 5. Index of family limitation m in selected republics, 1959–1985.

Mortality

Mortality—the other important factor of population change—will be treated less extensively in this paper, partly because we do not believe that mortality variations will play an important role in determinating future differentials between the population size of republics and secondly because published data on mortality are more fragmentary than on fertility and hence do not allow the analysis of time series of age specific rates.

Table 3 indicates that in 1970 life expectancy was highest in Armenia (72.9) and Belorussia (72.4) and lowest in Turkmenistan (68.4) and the Russian Republic (68.8). Generally, it is amazing to see how low the mortality differentials are as compared to the fertility differentials described above. The difference between maximum and minimum is only 4.5 years or 6% of the Armenian life expectancy.

Table 3. Life expectancies at birth, 1970–1985 by republic.

Republic	1970	1980	1985
RSFSR	68.8	67.5	69.3
UkrSSR	70.9	69.7	70.5
BelSSR	72.4	71.1	71.4
UzbSSR	71.8	67.6	68.2
KazSSR	70.1	67.0	68.9
GrSSR	71.9	71.2	71.6
AzSSR	69.2	68.1	69.9
LitSSR	71.1	70.5	71.5
MolSSR	69.1	65.6	66.4
LatSSR	70.2	68.9	70.2
KirSSR	67.9	66.0	67.9
TadSSR	69.9	66.3	69.7
ArmSSR	72.9	72.8	73.3
TurkmSSR	68.4	64.6	64.8
EstSSR	70.4	69.4	70.4

In 1980 published life expectancies are lower in each republic. Although the reasons for this partly significant increase in mortality in all republics over the 1970s remain unclear it seems to be the case that recently mortality conditions improved again. The figures published for 1985 show again significantly higher life expectancies than in 1980 and are in many cases higher than those reported for 1970. Again, Armenia is at the top of the list with a life expectancy of 73.3 years. The variation, however, seems to be higher in 1985 than it was in 1970.

For migration we will not make specific assumptions and only assume that the intensities remain as observed in 1970. For this reason there is also no need of discussion recent trends in migration here.

3. SETTING SCENARIOS FOR THE FUTURE

The scenario approach to population projection does not attempt to produce one most probable variant or possibly other less probable variants which result from rather complex sets of assumptions that are mostly not explicit. In contrast to the usual variants the scenario approach makes explicit relatively simple alternative assumptions. The purpose of this exercise is to compare results coming from different sets of assumptions and assess the impact of alternative future trends. In a way this is closer to sensitivity analysis of assumptions in population projection than to the prediction of future population sizes.

Following this logic we also do not want to specify complex assumptions of changing patterns of age-specific fertility and mortality but instead define three very simple scenarios. Rather than assuming future fertility and mortality trends for each republic separately we will define the scenarios according to two alternative principles concerning the differences between republics: convergence or continued diversity in fertility and mortality. Hence the following scenarios may be defined:

SCENARIO A: *Continued diversity*; fertility and mortality remain at the level observed in 1985

SCENARIO B: *Continued diversity in fertility*; convergence in mortality; fertility rates remain as in 1985, life expectancy increases gradually to 75.0 years in all republics by 2020, and remains constant thereafter.

SCENARIO C: *Convergence in fertility and mortality*; life expectancy increases gradually to 75.0 years and fertility goes to replacement level in all republics by the year 2020, both remain constant thereafter.

These three scenarios with the only alternatives of convergence and continued divergence seem to be much less specific than it could be made on the basis of the analysis of past fertility trends above. It was felt, however, that it would serve the comparative purpose better to give these rather general alternative scenarios, rather than construct possible further trends in the continuation of the demographic transition based on the current status of the development in each republic. Even for some of the Asian republics where the progress in the fertility transition seems to be rather clear, the timing of the future fertility decline could have been only speculation. Even more so, in the very low fertility republics of Europe assumptions on the future course of fertility levels would have been pure guessing. The assumption of a population reaching replacement fertility at some point in the future is not very original and there is no substantive reason why the replacement level should be more probable than any other low fertility level. For our compara-

tive analysis of future scenarios, however, such a simple assumption seems to serve its purpose as a point of reference for comparisons.

COMPARISON OF RESULTS

The population projections were performed by using Dialog (Scherbov and Grechucha 1988)—the system that allows the analyst to quickly obtain and visualize the consequences of alternative assumptions about future developments in demographic processes.

Selected results of the three alternative population projections according to the scenario assumptions specified above will be presented below in tabular and graphical form. Table 4 shows the impact of the assumed alternative demographic trends in the republics on the total population size and mean age of the complete Soviet Union. Tables 5 to 7 give the changes in the relative size of the republic within the total Soviet population of the specified age groups for the three different scenarios. Figures 6a-c will indicate the changes in the proportions of newborn and Figures 7a-c trends in the mean age of the population for selected republics according to the three alternative projections. Figures 8 and 9 finally give 3-D views of the changing age structure over time of two major republics, Uzbekistan and the Russian Republic.

Table 4 shows that in terms of total population size and mean age the scenarios result in very different patterns by the middle of the next century. While the assumption of a continuation of current fertility and mortality levels (scenario A) will result in a population that is by far the youngest of the three scenarios, the projected population size will be between those of scenarios B and C. It is obvious that the assumption of continued present fertility levels together with an increase in life expectancy (scenario B) will result in a somewhat older population age structure (because the mortality improvement will mostly affect people above the mean age of the population) and because of lower death rates at constant fertility rates also in a larger population size. According to scenario B the Soviet population would increase by more than 70% between 1970 and 2050 to 418 million.

An assumed convergence of the fertility levels in all republics towards replacement by the year 2020 together with convergent and somewhat increasing life expectancies results in a rapid aging of the Soviet population. While the total population size would stabilize around 350 million after 2035, the mean age of the population would increase very rapidly to about 40 years by the middle of the next century. This would mean an extremely high degree of aging even by the standards of currently rapidly aging societies in Western Europe.

Table 4. Resulting total population sizes (in millions) and mean ages for the total Soviet Union under scenarios A, B, and C.

	Scenario A		Scenario B		Scenario C	
Year	Total	Mean age	Total	Mean age	Total	Mean age
1970	242	31.2				
1975	253	32.3				
1980	264	33.1				
1985	275	33.6				
1990	285	34.2	285	34.2	285	34.2
1995	295	34.7	296	34.7	295	34.8
2000	304	35.1	306	35.3	304	35.5
2005	312	35.6	315	35.8	312	36.2
2010	320	35.8	325	36.3	320	37.3
2015	327	35.9	336	36.6	327	37.3
2020	335	36.0	346	36.8	333	37.9
2025	343	36.0	358	37.1	339	38.5
2030	351	36.0	369	37.1	344	38.5
2035	360	35.9	381	37.2	351	39.4
2040	369	35.7	392	37.1	351	39.6
2045	378	35.4	404	36.9	353	39.8
2050	389	35.1	418	36.6	354	39.9

Table 5. Shares of the individual republics on the total Soviet population and on certain age groups in the total Soviet Union according to Scenario A.

	Total			0–19 years			20–60 years			60+ years		
Republic	1980	2050	Dif.	1980	2050	Dif.	1980	2050	Dif.	1980	2050	Dif.
RSFSR	.530	.429	-.101	.472	.331	-.141	.554	.448	-.106	.558	.518	-.040
UkrSSR	.188	.145	-.044	.167	.115	-.051	.190	.149	-.040	.225	.172	-.053
BelSSR	.037	.030	-.007	.035	.024	-.011	.037	.030	-.007	.038	.035	-.003
UzbSSR	.055	.134	.080	.087	.207	.120	.043	.121	.078	.034	.069	.035
KazSSR	.057	.071	.013	.072	.078	.006	.055	.070	.015	.039	.062	.023
GrSSR	.019	.013	-.006	.020	.011	-.009	.018	.012	-.006	.019	.016	-.003
AzSSR	.023	.034	.011	.033	.041	.008	.020	.033	.013	.013	.026	.013
LitSSR	.013	.010	-.003	.012	.008	-.004	.013	.010	-.003	.014	.012	-.002
MolSSR	.015	.013	-.002	.016	.012	-.004	.015	.013	-.002	.013	.012	-.001
LatSSR	.009	.008	-.001	.008	.006	-.002	.010	.008	-.001	.012	.009	-.003
KirSSR	.013	.022	.009	.019	.030	.011	.011	.020	.009	.009	.015	.006
TadSSR	.014	.045	.031	.023	.075	.053	.011	.039	.028	.007	.019	.012
ArmSSR	.011	.013	.002	.014	.012	-.002	.011	.013	.002	.006	.015	.009
TurkmSSR	.010	.026	.016	.016	.041	.025	.008	.024	.016	.006	.012	.006
EstSSR	.006	.006	.001	.005	.005	.000	.006	.007	.001	.007	.007	-.000
USSR	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	

Table 6. Shares of the individual republics on the total Soviet population and on certain age groups in the total Soviet Union according to Scenario B.

	Total			0–19 years			20–60 years			60+ years		
Republic	1980	2050	Dif.	1980	2050	Dif.	1980	2050	Dif.	1980	2050	Dif.
RSFSR	.530	.434	-.096	.472	.331	-.142	.554	.449	-.105	.558	.524	-.033
UkrSSR	.188	.144	-.045	.167	.114	-.053	.190	.148	-.042	.225	.169	-.056
BelSSR	.037	.029	-.008	.035	.024	-.011	.037	.030	-.007	.038	.034	-.005
UzbSSR	.055	.133	.079	.087	.209	.123	.043	.122	.079	.034	.068	.034
KazSSR	.057	.071	.013	.072	.078	.006	.055	.070	.016	.039	.062	.023
GrSSR	.019	.013	-.006	.020	.011	-.009	.018	.012	-.006	.019	.015	-.004
AzSSR	.023	.034	.011	.033	.041	.008	.020	.033	.013	.013	.026	.012
LitSSR	.013	.010	-.003	.012	.008	-.004	.013	.010	-.003	.014	.012	-.002
MolSSR	.015	.013	-.002	.016	.012	-.004	.015	.013	-.001	.013	.014	.001
LatSSR	.009	.008	-.001	.008	.006	-.002	.010	.008	-.001	.012	.009	-.003
KirSSR	.013	.022	.009	.019	.031	.011	.011	.021	.009	.009	.015	.006
TadSSR	.014	.044	.030	.023	.075	.053	.011	.039	.028	.007	.018	.011
ArmSSR	.011	.013	.002	.014	.012	-.002	.011	.013	.002	.006	.013	.007
TurkmSSR	.010	.027	.017	.016	.043	.027	.008	.025	.017	.006	.013	.008
EstSSR	.006	.006	.001	.005	.005	.000	.006	.007	.001	.007	.007	-.000

Table 7. Shares of the individual republics on the total Soviet population and on certain age groups in the total Soviet Union according to Scenario C.

	Total			0–19 years			20–60 years			60+ years		
Republic	1980	2050	Dif.	1980	2050	Dif.	1980	2050	Dif.	1980	2050	Dif.
RSFSR	.530	.515	-.015	.472	.511	.039	.554	.514	-.040	.558	.526	-.032
UkrSSR	.188	.172	-.016	.167	.174	.007	.190	.172	-.016	.225	.169	-.055
BelSSR	.037	.034	-.003	.035	.035	-.001	.037	.035	-.003	.038	.034	-.005
UzbSSR	.055	.071	.016	.087	.073	-.014	.043	.071	.027	.034	.067	.033
KazSSR	.057	.062	.005	.072	.062	-.010	.055	.061	.007	.039	.062	.023
GrSSR	.019	.014	-.005	.020	.013	-.006	.018	.013	-.005	.019	.015	-.004
AzSSR	.023	.026	.003	.033	.027	-.007	.020	.026	.006	.013	.025	.012
LitSSR	.013	.012	-.001	.012	.012	-.000	.013	.012	-.001	.014	.012	-.002
MolSSR	.015	.014	-.001	.016	.014	-.002	.015	.014	-.001	.013	.014	.001
LatSSR	.009	.010	.000	.008	.010	.002	.010	.010	.000	.012	.009	-.003
KirSSR	.013	.015	.001	.019	.015	-.005	.011	.014	.003	.009	.015	.006
TadSSR	.014	.020	.006	.023	.021	-.002	.011	.020	.009	.007	.018	.011
ArmSSR	.011	.013	.002	.014	.013	-.001	.011	.013	.002	.006	.013	.007
TurkmSSR	.010	.014	.004	.016	.014	-.002	.008	.014	.006	.0016	.013	.007
EstSSR	.006	.007	.002	.005	.007	.003	.006	.008	.002	.007	.007	-.000

From the figures and tables referring to the individual republics and comparing the changes in their relative sizes, it becomes apparent that the differences between scenario A and B are much less than their difference from scenario C. This indicates that the assumption made on fertility trends have greater impact on the future population composition than those made on life expectancy.

Assuming constant fertility and mortality rates (scenario A) will result in very dramatic changes in the population structure of the Soviet Union. The Russian Republic that currently has more than half of the Soviet population would increase in absolute terms from 140 Million to 183 Million by 2050 but in relative terms it would shrink by more than 10 percentage points to slightly above 40 percent of the total Soviet popula-

tion. In sharp contrast to this Uzbekistan would almost double its population size and increase its share of the total Soviet population from 5% to 13%. Tadzhikistan and Turkmenistan will also grow at a similar speed under assumed constancy of present fertility and mortality rates. On the loosing side are aside from Russia, Ukrainia, Belorussia, and Georgia. The Baltic Republics would grow at about the same speed as the total Soviet Union and therefore hold their relative position.

For the young age group (0–19) these changes under assumed constancy of rates would be even more pronounced. In 2050 only 33% of the young people would live in Russia whereas more than 20% would live in Uzbekistan, and 8% in Kazakhstan and Tadzhikistan each. The same pattern is apparent in the graph of the relative distribution of newborns by republic (Figure 7a). For the older age groups the changes go into the same direction but are less pronounced than for the total or for the younger age groups. This is not only due to the fact that those people belong to the still smaller cohorts already born or to be born in the next years, but is also due to assumed persistence in mortality differentials that indicate somewhat lower life expectancies in the Asian parts

Another scenario that assumes constant fertility levels for each republic but an convergence in mortality towards a life expectancy of 75 in all republics (scenario B) results in essentially the same pattern as described above for scenario A. One difference between the results from the two scenarios is that the loss in the relative size of the European republics will be even higher for republics that already now have high life expectancies. The Russian Republic with currently relatively adverse mortality conditions would hence profit from the assumed increase in life expectancy more than e.g. Ukraine and Belorussia and would show a faster increase of its population than under scenario A. Because some mortality improvement is assumed in every republic, each of them will grow faster than under scenario A and the total population of the Soviet Union in 2050 would be 418 Million instead of the 389 Million under scenario A, as discussed above.

The assumptions of convergence in mortality and fertility (scenario C), finally, will have a very great impact on the population structure. All republics would grow substantially, even those who have currently sub-replacement fertility such as Russia and the Ukraine. But for the currently high fertility republics the growth would be much less than under the previous two scenarios. As a consequence of the above stated trends a convergence in fertility towards replacement level in all republics would lead to much less significant changes in the share of individual republics in the total Soviet population.

Figures 8 and 9, finally, give 3–D presentations of possible changes of the age structure under the assumptions of scenarios A and C for two selected republics, Russia and Uzbekistan. Since in the Russian Republic fertility is already below replacement level,

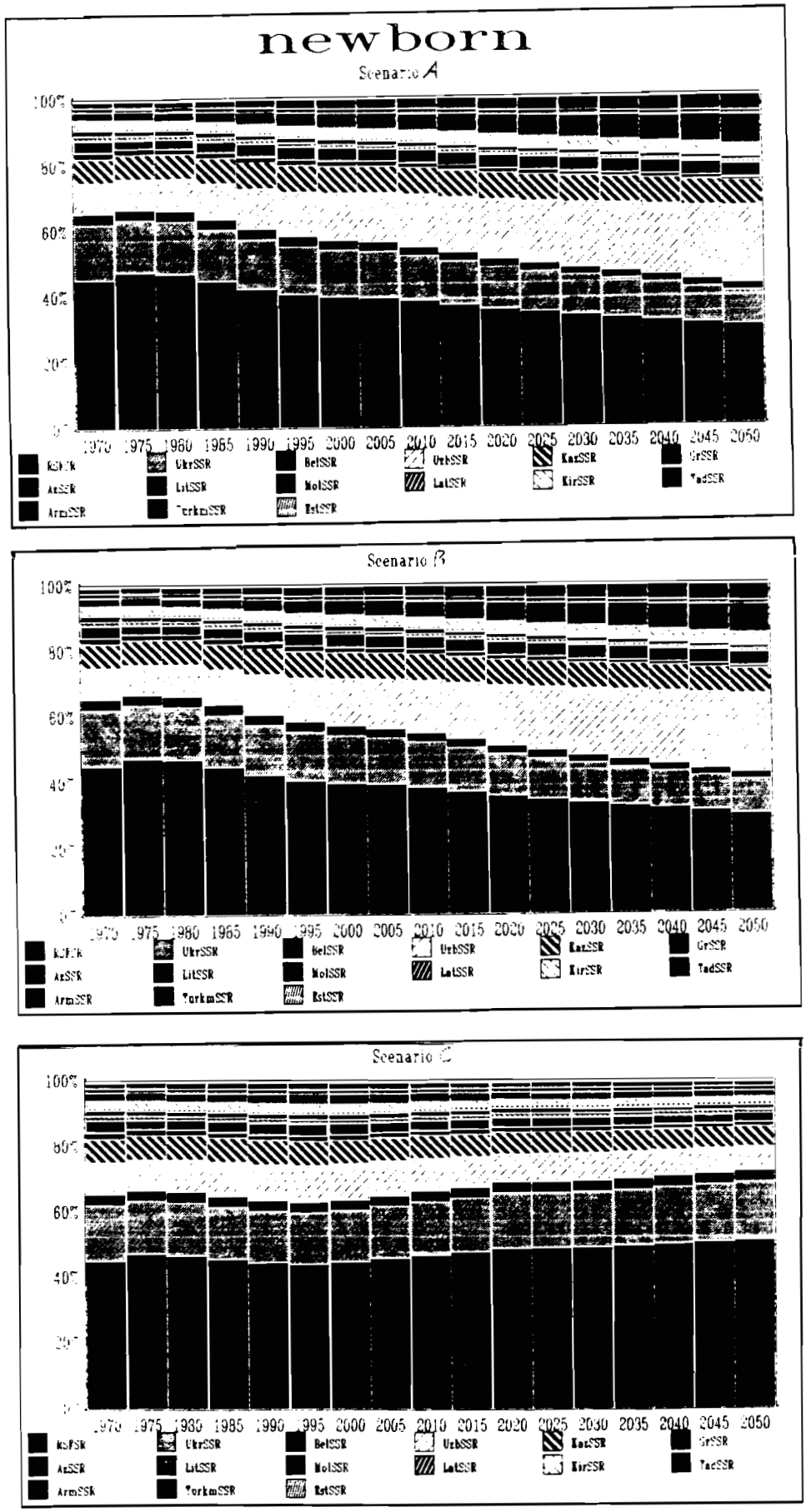


Figure 6. Proportions of all births in the USSR by republics 1970–2050 under scenarios A, B, and C.

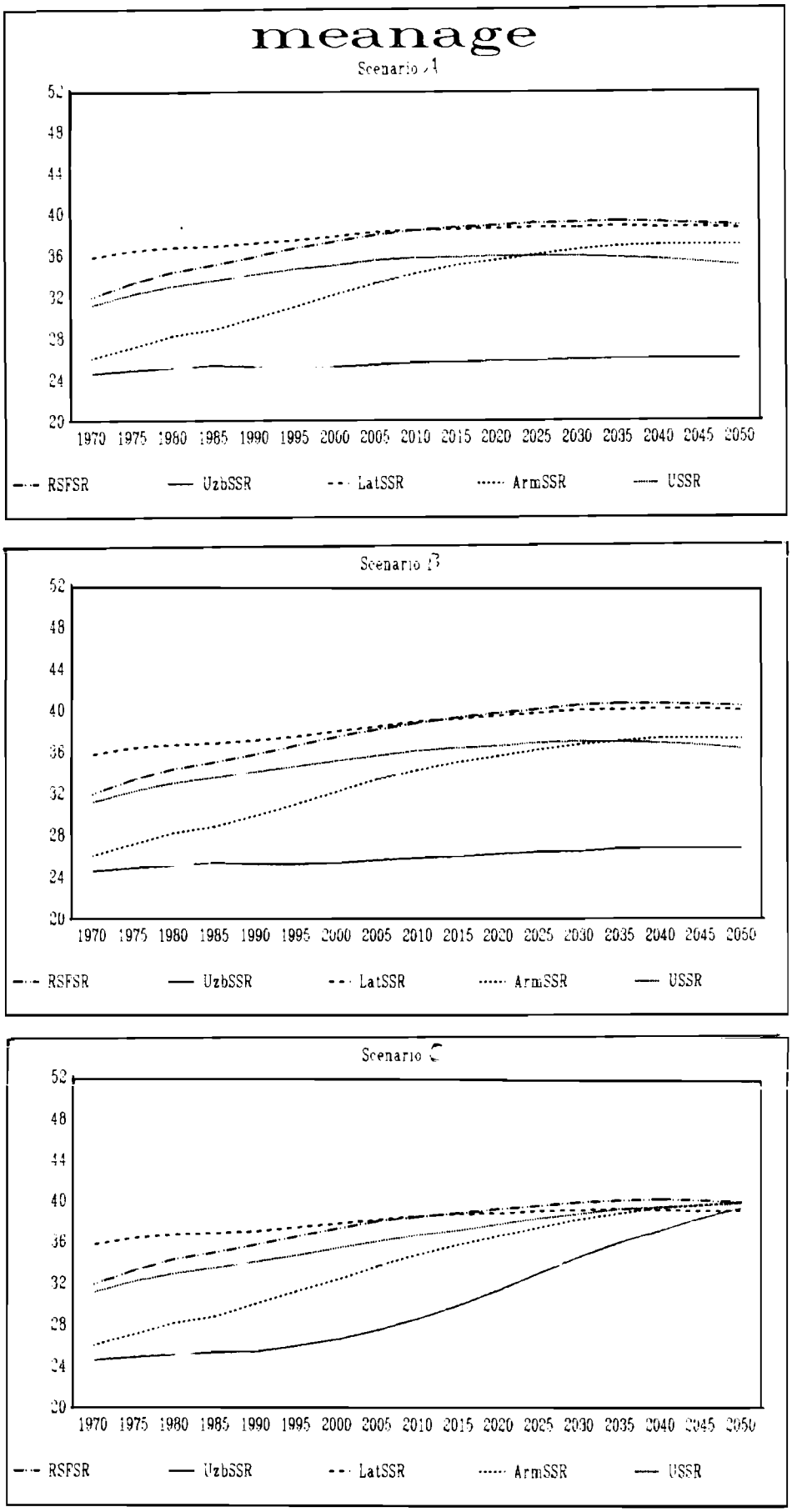
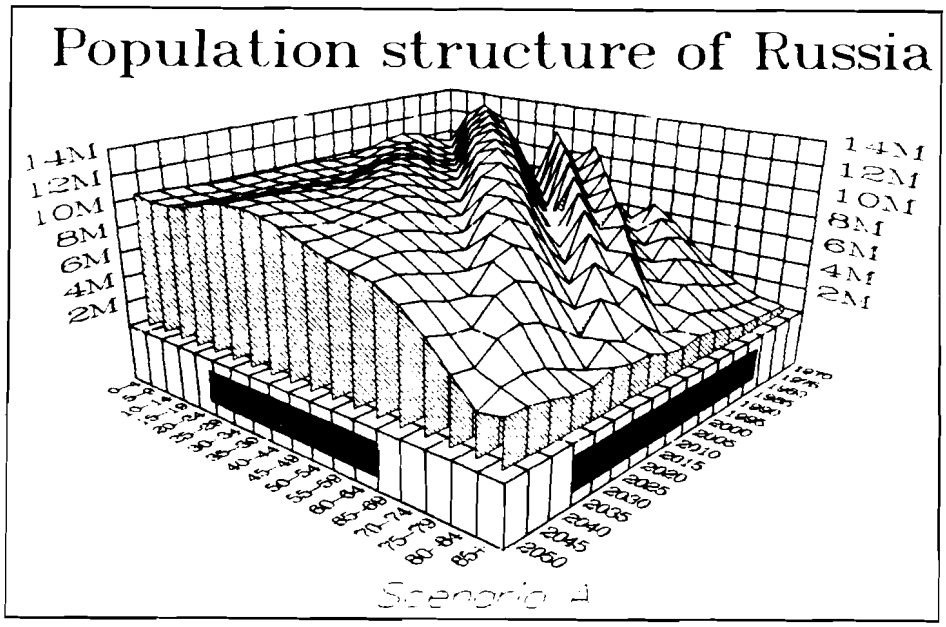


Figure 7. **Trends in mean ages of the population 1970–2050 for the USSR and selected republics under the assumptions of scenarios A, B, and C.**



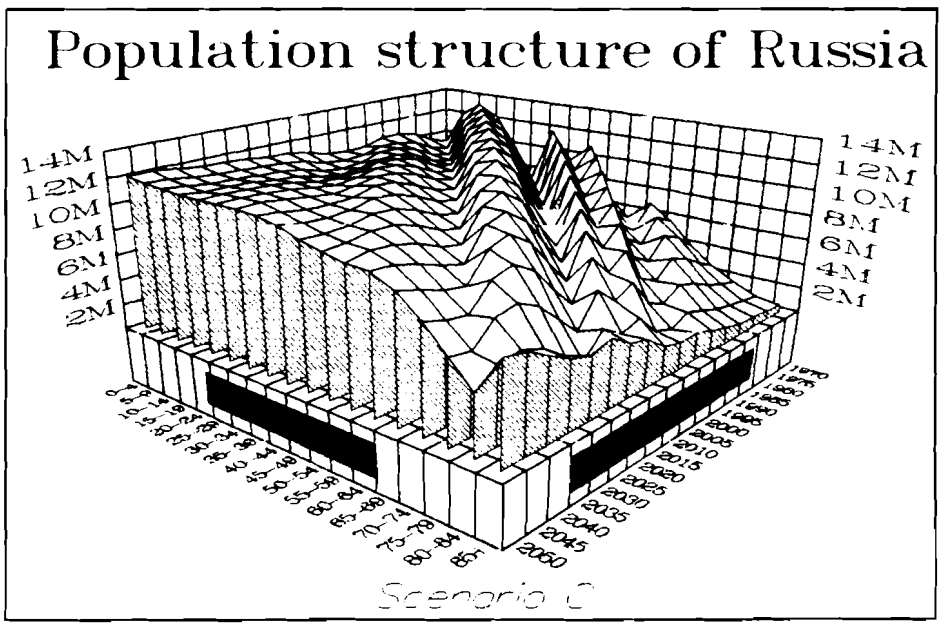


Figure 8. 3–D presentation of the population age structure in Russian Republic 1970–2050 as projected under scenarios A and C.

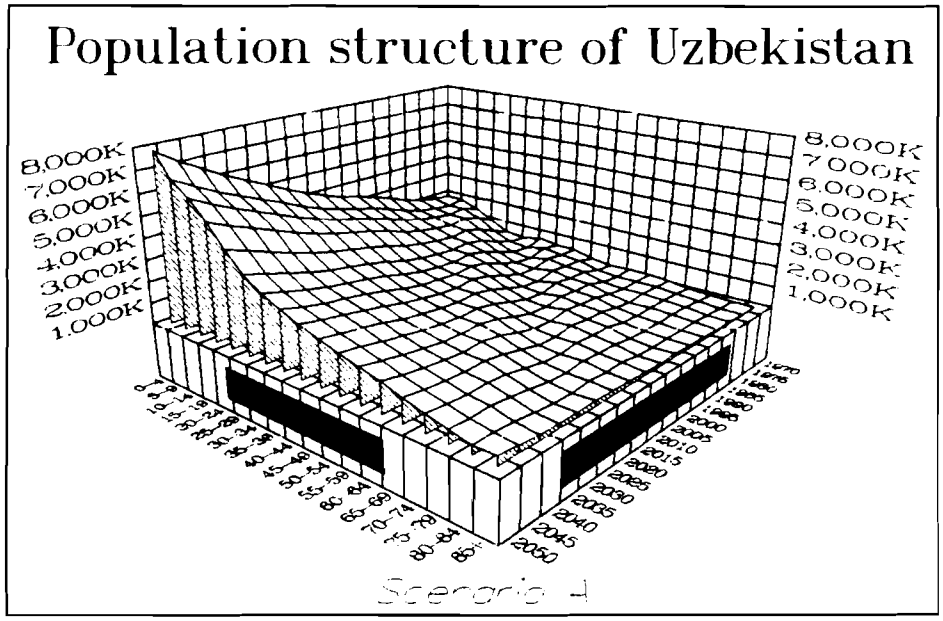
now the future trends will go towards a rectangularization of the age structure in both cases. Under scenario C the assumed increases in life expectancy result in a clearly greater number of people above age 60 under scenario A. Especially the cohorts of the Russian baby boom in the 1960s would profit greatly from the mortality improvement. Hence the ridge crossing the figures diagonally is much stronger towards the older end under scenario C than under C.

For Uzbekistan the difference between the two scenarios is much more dramatic. Under assumed constant fertility and mortality rates the population would explode and show the typical pattern of a very high fertility country. Under an assumed trend towards replacement level by 2020, however, the largest cohorts would be born towards the end of the century followed by a steep decline in births. In the very left corner we can then even see the weak echo of these larger birth cohorts. If fertility should enter such a steep decline in Uzbekistan as it already did in Armenia and later on in Azerbayazhan, the future population structure would by the middle of the next century become similar to today's age structure in the European parts of the CSSR.

Concluding Remarks

All scenarios defined in this study indicate that the Soviet Union currently is experiencing a significant restructuring (*Perestroika*) also in demographic terms and that these trends will continue even stronger over the next decades. In case of a convergence of the fertility trends of all republics the change in the population structure would be less than in the case of a continuation of current diversity.

For demographers changes in the Asia republics can give a very interesting lesson on demographic transition that has not been studied much so far.



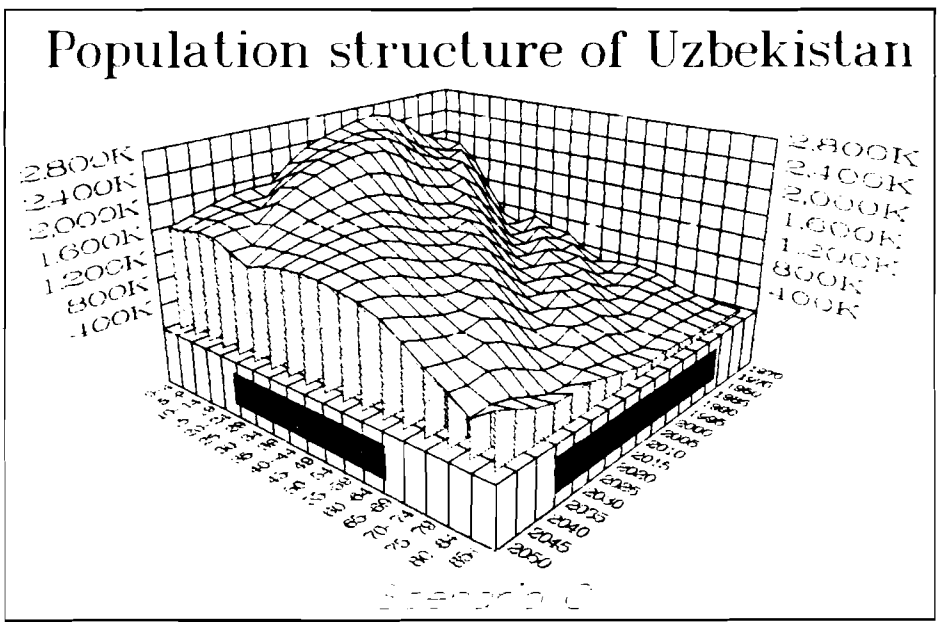


Figure 9. 3–D presentation of the population age structure in Uzbekistan 1970–2050 as projected under scenarios A and C.

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